

WHAT IS CLAIMED IS:

1. A plasma etching gas suitable for etching a silicon layer in a silicon oxide etching device, the plasma etching gas comprising:

a fluoro-alkane gas; and

5 a nitrogen gas.

2. The plasma etching gas of claim 1, wherein a flow rate of the nitrogen is about 1 sccm to about 50 sccm.

3. The plasma etching gas of claim 1, wherein the fluoro-alkane is selected from a group consisting of CF<sub>4</sub>, C<sub>2</sub>F<sub>6</sub>, C<sub>3</sub>F<sub>8</sub>, C<sub>4</sub>F<sub>8</sub>, CH<sub>3</sub>F, CHF<sub>3</sub> and CH<sub>2</sub>F<sub>2</sub>.

10 4. The plasma etching gas of claim 1, further comprising an argon gas.

5. The plasma etching gas of claim 4, wherein a flow rate of the argon gas is about 50 sccm to about 150 sccm.

6. A plasma etching gas suitable for etching a silicon layer in a silicon oxide etching device, the plasma etching gas comprising:

15 a partially fluoro-substituted alkane gas;

a fully fluoro-substituted alkane gas; and

a nitrogen gas.

7. The plasma etching gas of claim 6, wherein a flow rate of the nitrogen is about 1 sccm to about 50 sccm.

8. The plasma etching gas of claim 6, wherein the fully fluoro-substituted alkane is selected from a group consisting of  $\text{CF}_4$ ,  $\text{C}_2\text{F}_6$ ,  $\text{C}_3\text{F}_8$  and  $\text{C}_4\text{F}_8$ .

5 9. The plasma etching gas of claim 1, wherein the partially fluoro-substituted alkane gas is selected from a group consisting of  $\text{CH}_3\text{F}$ ,  $\text{CHF}_3$  and  $\text{CH}_2\text{F}_2$ .

10. The plasma etching gas of claim 6, wherein the partially fluoro-substituted alkane gas is  $\text{CHF}_3$ , and the fully fluoro-substituted alkane gas is  $\text{CF}_4$ .

10 11. The plasma etching gas of claim 10, wherein a ratio of  $\text{CHF}_3$  to  $\text{CF}_4$  is about 3/1 to about 15/1.

12. The plasma etching gas of claim 10, wherein a flow rate of the nitrogen is about 1 sccm to about 50 sccm.

13. The plasma etching gas of claim 10, further comprising an argon gas.

14. The plasma etching gas of claim 13, wherein the flow rate of the argon gas is 15 in the range of about 50 sccm to about 150 sccm.

15. The plasma etching gas of claim 6, wherein a ratio of  $\text{CHF}_3$  to  $\text{CF}_4$  is about 3/1 to about 15/1.

16. The plasma etching gas of claim 6, further comprising an argon gas.

17. The plasma etching gas of claim 16, wherein flow rate of the argon gas is about 50 sccm to about 150 sccm.

18. A method of producing a semiconductor device, comprising:

providing a substrate;

5 forming an oxide layer on the substrate;

providing an etching gas consisting of fluoro-alkane gas and nitrogen gas; and

etching the oxide layer by using the etching gas.

19. The method of claim 18, wherein a flow rate of the nitrogen gas is about 1 sccm to about 50 sccm.

10 20. The method of claim 18, wherein the fluoro-alkane is selected from a group consisting of  $\text{CF}_4$ ,  $\text{C}_2\text{F}_6$ ,  $\text{C}_3\text{F}_8$ ,  $\text{C}_4\text{F}_8$ ,  $\text{CH}_3\text{F}$ ,  $\text{CHF}_3$  and  $\text{CH}_2\text{F}_2$ .

21. The method of claim 18, wherein the etching gas further comprises an argon gas.

22. The method of claim 21, wherein flow rate of the argon gas is about 50 sccm  
15 to about 150 sccm.